The Panda Math Tutor

Sets

IGCSE Mathematics

The Panda Math Tutor

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1 Introduction to Sets

Note

Sets are one of the most fundamental concepts in mathematics. A set is simply a well-defined collection of objects, and set theory provides the language we use to describe groups, categories, and relationships between collections. Sets appear throughout IGCSE examinations, particularly in Venn diagram problems and probability questions.

In this chapter, we will explore:

- Understanding sets and set notation — Section 2
- Types of sets — Section 3
- Venn diagrams — Section 4
- Set operations — Section 5
- Shading Venn diagrams — Section 6
- Problems involving three sets — Section 8
- Set-builder notation and number sets — Section 9

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2 Sets and Set Notation

Definition

A **set** is a well-defined collection of distinct objects. The objects in a set are called **elements** or **members** of the set.
Sets are usually denoted by capital letters: A, B, C, ...
Elements are listed inside curly brackets (braces): $A = \{1, 3, 5, 7, 9\}$

Note

Key Terminology and Symbols:

- $\in$ means "is an element of" (e.g. $3 \in A$ means "3 is in set A")
- $\notin$ means "is not an element of" (e.g. $4 \notin A$ means "4 is not in set A")
- $n(A)$ means "the number of elements in set A" (e.g. if $A = \{1, 3, 5, 7, 9\}$, then

$n(A) = 5$)

Example

Let $A = \{3, 7, 11, 15, 19\}$.
State whether each of the following is true or false:
(a) $7 \in A$ (b) $9 \in A$ (c) $15 \notin A$ (d) $n(A) = 5$

Solution:

(a) $7 \in A$ True — 7 is in the set

(b) $9 \in A$ False — 9 is not in the set (should be $9 \notin A$)

(c) $15 \notin A$ False — 15 IS in the set (should be $15 \in A$)

(d) $n(A) = 5$ True — there are 5 elements in set A

Example

Write the following sets using set notation:
(a) The set of distinct consonants in the word "MATHEMATICS".
(b) The set of odd prime numbers less than 30.
(c) The set of multiples of 3 between 1 and 20 (inclusive).

Solution:

(a) $C = \{M, T, H, C, S\}$

(b) $P = \{3, 5, 7, 11, 13, 17, 19, 23, 29\}$

(c) $D = \{3, 6, 9, 12, 15, 18\}$

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Warning

Common Mistake: Repeating elements in a set!
Each element in a set is listed **only once**. Sets contain **distinct** elements.
Incorrect: The letters in the word "TOFFEE" $= \{T, O, F, F, E, E\}$
Correct: The letters in the word "TOFFEE" $= \{T, O, F, E\}$
Also note: the **order** of elements does not matter. $\{1, 2, 3\} = \{3, 1, 2\}$.

Preview ends here

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